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John L. Harris  
*Arkansas State University*

Peter J. Rust  
*Arkansas State University*

Alan D. Christian  
*Arkansas State University*

William R. Posey II  
*Arkansas State University*

Chris L. Davidson  
*Arkansas State University*

*See next page for additional authors*

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# Revised Status of Rare and Endangered Unionaea (Mollusca: Margaritiferidae, Unionidae) in Arkansas

## **Authors**

John L. Harris, Peter J. Rust, Alan D. Christian, William R. Posey II, Chris L. Davidson, and George L. Harp

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Department of Biological Sciences

Arkansas State University

State University, AR 72467-0599.

### Abstract

Harris and Gordon (1987) reviewed the distribution and status of 18 rare and /or endangered unionacean bivalve species (commonly referred to as clams, mussels, freshwater mussels, naiads) that occur or have occurred in Arkansas. They discussed four species that were federally listed as endangered, four species that were considered endangered or extirpated within Arkansas, four species considered threatened within Arkansas, four species of special concern within Arkansas, and two species for which the conservation status was considered uncertain due to questions regarding taxonomic validity. Numerous unionacean field surveys have been performed during 1986-1996, and a substantial database of new distributional and relative abundance information has been accumulated. Two additional unionacean species have been listed as federally endangered, one additional species has been listed as federally threatened, and one endangered species has been newly discovered within Arkansas bringing the total number of federally protected unionacean species occurring within Arkansas to eight. The conservation status of 16 additional unionacean species occurring in Arkansas is discussed also.

### Introduction

During the past 35 years, abundance and species diversity of native unionacean bivalves have declined throughout the United States and Canada (Williams et al. 1993). The Nature Conservancy recognized 55% of North American unionaceans as extinct or imperiled (Master, 1990). Harris and Gordon (1987) considered eighteen of the 69 unionacean species (26%) known or thought to occur in Arkansas (Gordon et al., 1980) as rare and/or endangered within the state.

Approximately 10 years have passed since Harris and Gordon (1987) reviewed the status of the Arkansas unionacean fauna, and substantial additional distributional and relative abundance data for Arkansas unionaceans have been obtained. In this paper, the purpose is to provide a comprehensive review of the conservation status for all native unionacean bivalves known to occur in Arkansas.

### Materials and Methods

The distribution and population structure of unionacean aggregations (= mussel beds) within approximately 1375 kilometers (km) (860 river miles) and 182 impounded or oxbow km (114 river miles) were determined during large river surveys conducted from 1991-1996. Surveys were conducted in the Black, Cache, Current, Little Missouri, Ouachita, Saline, Spring, St. Francis, Strawberry, and White rivers, the Lake Ozark and Lake Dardanelle pools of the

Arkansas River, Blue Mountain Lake and Lake Chicot (Harris et al., 1993). In addition, the authors have performed numerous smaller scale surveys (with reports) during the past 10 years further elucidating the distribution, relative abundance and habitat requirements of Arkansas unionaceans.

Survey methods included primarily Hookah diving as detailed in Harris et al. (1993), Rust (1993), and Christian (1995) and/or snorkeling techniques (Harris and Gordon, 1988). Qualitative, semi-quantitative, and quantitative sampling protocols have all been utilized (Rust, 1993; Christian, 1995; and Stoeckel et al., 1996).

The distribution and status of species discussed in this paper were derived by plotting site occurrences and reviewing abundance data, relative or quantitative, for data included in Harris and Gordon (1987) and those obtained in the ensuing 10 years. Taxa discussed in this paper are divided into two groups: (1) Federal Listed Species, and (2) Other Species of State Concern. A third category, Species Under Federal Review, utilized in Harris and Gordon (1987), has been dropped from this paper because the U.S. Fish and Wildlife Service (1996) has revised its animal notice of review categories. Former Category 2 and 3 candidate listings have been discontinued, and Category 1 species are now listed as taxa proposed to be listed as endangered (PE) or taxa proposed to be listed as threatened (PT). There are no mussel taxa that occur in Arkansas which have been included in the most recent review of plant and animal taxa that are candidates for listing as endangered or threatened species (U.S. Fish and Wildlife Service 1996).

## Revised Status of Rare and Endangered Unionacea (Mollusca: Margaritiferidae, Unionidae) in Arkansas

The Nature Conservancy utilizes its central conservation databases and the network of natural heritage programs to determine a global conservation rank for mussels (C. Osborne, pers. comm.) Global Rank categories used by The Nature Conservancy are: G1 - critically imperiled globally because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction; G2 imperiled globally because of rarity (six to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction; G3 - either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g. a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout its range, in terms of occurrences, a range of 21 to 100; G4 - apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery; G5 - demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery; GH - of historical occurrence throughout its range, i.e. formerly part of the established biota, with the expectation that it may be rediscovered.

Conservation status categories utilized in this paper follow Williams et al. (1993) and are defined as: Endangered (E) - a species or subspecies in danger of extinction throughout all or a significant portion of its range; Endangered, probably extirpated (EX) - a species or subspecies that is probably extinct from the geographic unit being considered; Threatened (T) a species or subspecies that is likely to become endangered throughout all or a significant portion of its range; Special Concern (SC) - a species or subspecies that may become endangered or threatened by relatively minor disturbances to its habitat, and deserves careful monitoring of its abundance and distribution; Undetermined (U) - a species or subspecies whose historic and current distribution and abundance has not been evaluated in recent years; Currently Stable (CS) - a species or subspecies whose distribution and abundance may be stable, or it may have declined in portions of its range but is not in need of immediate conservation management actions.

Nomenclature follows Turgeon et al. (1988) as modified by Williams et al. (1993). Posey et al. (1996) recognized 74 taxa of mussels to have occurred historically within Arkansas.

## Results

Table 1 summarizes the conservation status assigned to rare Arkansas mussels by the U.S. Fish and Wildlife Service (1996), The Nature Conservancy (C. Osborne, pers. comm.), Williams et al. (1993), and Harris and Gordon

(1987). The table and following text address federally listed endangered and threatened species (listed alphabetically) first, followed by species of state concern that are segregated by conservation status listing (i.e. endangered, threatened, special concern, currently stable). The revised conservation status listing for Arkansas unionacean species as proposed in this paper is found in the last column of Table 1. All Arkansas unionaceans listed by Posey et al. (1996) but not listed in Table 1 are considered to be currently stable (CS).

## Federal Listed Species

*Arkansia wheeleri* Ortmann and Walker, 1912 - Ouachita rock-pocketbook. Distribution: Figure 1. STATUS: National and State -Endangered.

The U.S. Fish and Wildlife Service (1991) listed the Ouachita rock-pocketbook as endangered (without critical habitat), and a recovery plan for *Arkansia wheeleri* has been prepared (U.S. Fish and Wildlife Service 1994). Harris and Gordon (1987) suggested the Ouachita rock-pocketbook might have been extirpated within Arkansas. Clarke (1987) subsequently found a small number of individuals in an 8-km reach of Little River running east from the Oklahoma - Arkansas state line, Little and Sevier counties. Clarke (1987) estimated the entire Little River population to be fewer than 100 individuals. Posey et al. (1996) rediscovered the Ouachita rock-pocketbook in the Ouachita River (River Mile 334.0) downstream of Camden, Ouachita County, Arkansas. The Ouachita rock-pocketbook had not been recorded alive from the Ouachita River since Wheeler (1918), and its discovery downstream of Camden indicates the species can occur in larger rivers than previously documented. The Ouachita rock-pocketbook remains extremely rare globally and within Arkansas.

*Epioblasma florentina curtisi* (Utterback, 1916) - Curtis pearlymussel. Distribution: Harris and Gordon (1987). STATUS: National and State Endangered.

No additional data have been acquired since Harris and Gordon (1987). Its state status is continued as endangered rather than extirpated because the species remains extant in the Little Black River system in Missouri.

*Epioblasma turgidula* (Lea, 1858) - turgid blossom. Distribution: Harris and Gordon (1987). STATUS: National and State Extirpated.

No additional data have been acquired since Harris and Gordon (1987) who considered this species endangered in Arkansas. The status within Arkansas is changed to possibly extinct in agreement with Harris and Gordon (1990) and Williams et al. (1993).

*Lampsilis abrupta* (Say, 1831) - pink mucket Distribution: Figure 2. STATUS: Federal - Endangered, State - Threatened.

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Table 1. Summary of conservation status rankings for Arkansas' rare unionacean bivalves.

Scientific Name common name	TNC Global Rank	Federal Status	Williams et al. 1993	Harris and Gordon 1987	Revised AR Status
<i>Arkansia wheeleri</i> Ouachita rock pocketbook	G1	E	E	EX	E
<i>Epioblasma florentina curtisi</i> Curtis' pearly mussel	G1	E	E	E	E
<i>Epioblasma turgidula</i> turgid blossom	GH	E	EX	E	EX
<i>Lampsilis abrupta</i> pink mucket	G2	E	E	E	T
<i>Lampsilis powelli</i> Arkansas fatmucket	G1G2	T	T	T	T
<i>Lampsilis streckeri</i> speckled pocketbook	G1Q	E	E	U	E
<i>Potamilus capax</i> fat pocketbook	G1	E	E	E	T
<i>Quadrula fragosa</i> winged mapleleaf	G1	E	E	NL	E
<i>Alasmodonta viridis</i> slippershell	G4	NL	SC	NL	E
<i>Cumberlandia monodonta</i> spectaclecase	G2G3	NL	T	EX	E
<i>Epioblasma triquetra</i> snuffbox	G3	NL	T	E	E
<i>Potamilus alatus</i> pink heelsplitter	G5	NL	CS	E	E
<i>Simpsonaias ambigua</i> salamander mussel	G3	NL	SC	T	E
<i>Lampsilis rafinesqueana</i> Neosho mucket	G2	SS	T	T	T
<i>Leptodea leptodon</i> scaleshell	G1G2	SS	E	T	T
<i>Quadrula apiculata</i> southern mapleleaf	G5	NL	CS	NL	T
<i>Anodonta suborbiculata</i> flat floater	G5	NL	CS	SC	SC
<i>Cyprogenia aberti</i> western fanshell	G2	NL	T	SC	SC
<i>Obovaria iacksoniana</i> southern hickorynut	G2G3	NL	SC	NL	SC
<i>Quadrula C. cylindrica</i> rabbitsfoot	G3	NL	T	SC	SC
<i>Toxolasma lividus</i> purple lilliput	G1G2Q	NL	SC	NL	SC
<i>Villosa arkansasensis</i> Ouachita creekshell	G2	NL	SC	NL	SC
<i>Pleurobema pyramidatum</i> pyramid pigtoe	G2	NL	T	SC	CS



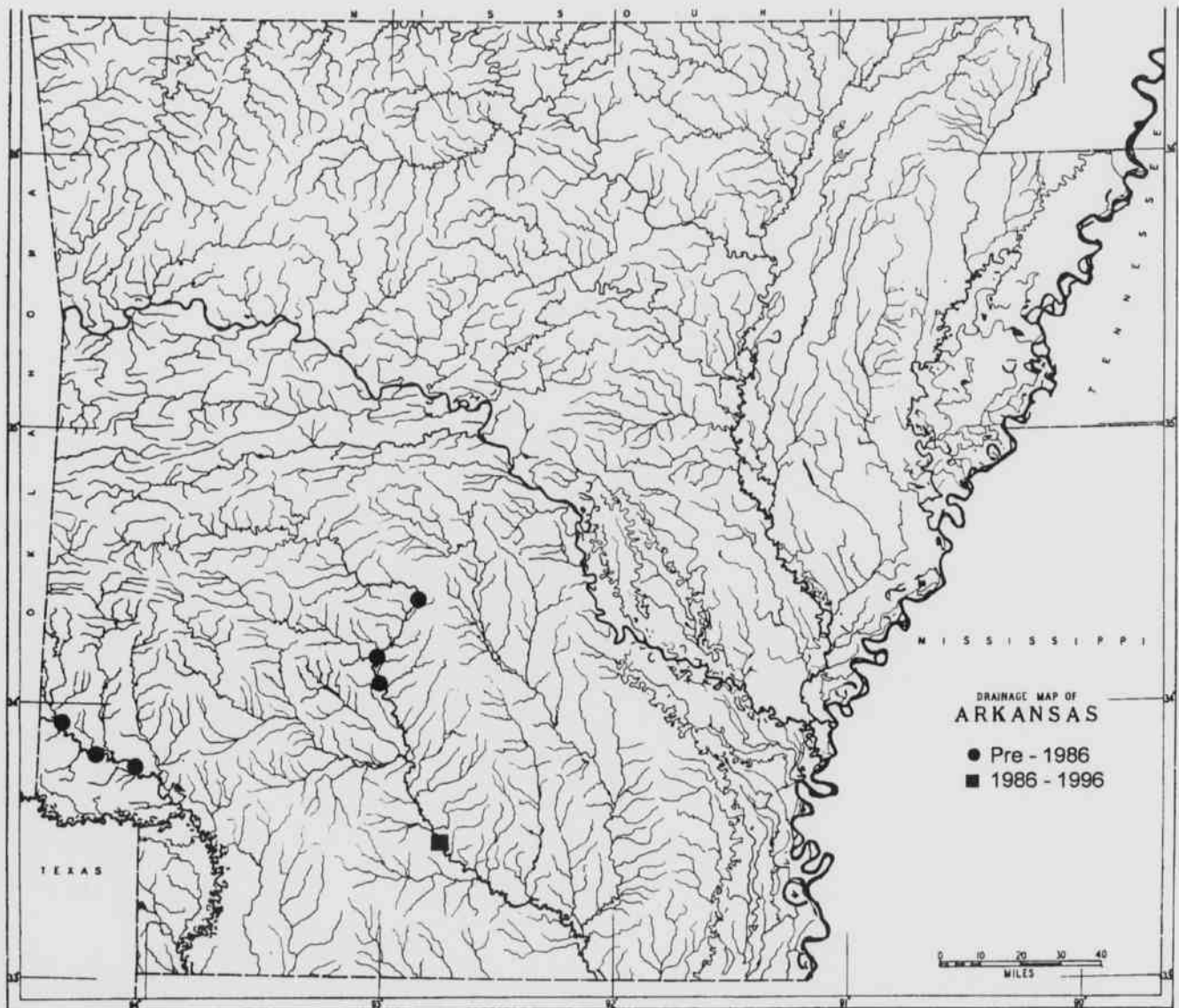


Fig. 1. Distribution of *Arkansia wheeleri*.

Harris and Gordon (1987) discussed the systematics of the pink mucket, as *Lampsilis orbiculata* (Hildreth, 1828), which Turgeon et al. (1988) suppressed in favor of *Lampsilis abrupta* (Say, 1831). Rust (1993) encountered 31 live pink muckets from 19 of 48 (39.6%) unionacean aggregations in an approximately 175-km reach (River Miles 50.5 - 161.5) of the Black River. The maximum number of pink muckets sampled from an individual Black River unionacean aggregation (River Mile 151.1) was five which was 1.3% of total mussels examined from the bed and yielded a population estimate of  $500 \pm 102$ . Rust (1993) also found 11 pink mucket specimens from four of six sites (66.7%) in approximately

18 km of the Spring River. Again, the maximum number of pink muckets encountered in a single aggregation was five, which was 1.5% of total unionaceans examined from the aggregation and yielded a population estimate of  $121 \pm 24$ . Posey (1997) encountered a total of nine pink musket individuals at eight sites in the Ouachita River. Christian (1995) found a single pink mucket at four of 51 sites (7.8%) examined in the White River, and a single pink mucket was tentatively identified from the Cache River. Additional small scale surveys for the pink mucket in the White River (Harris, 1987, 1989a, 1989b, 1989d, 1990c, 1994c, 1995, 1997c) yielded individuals at the White River downstream

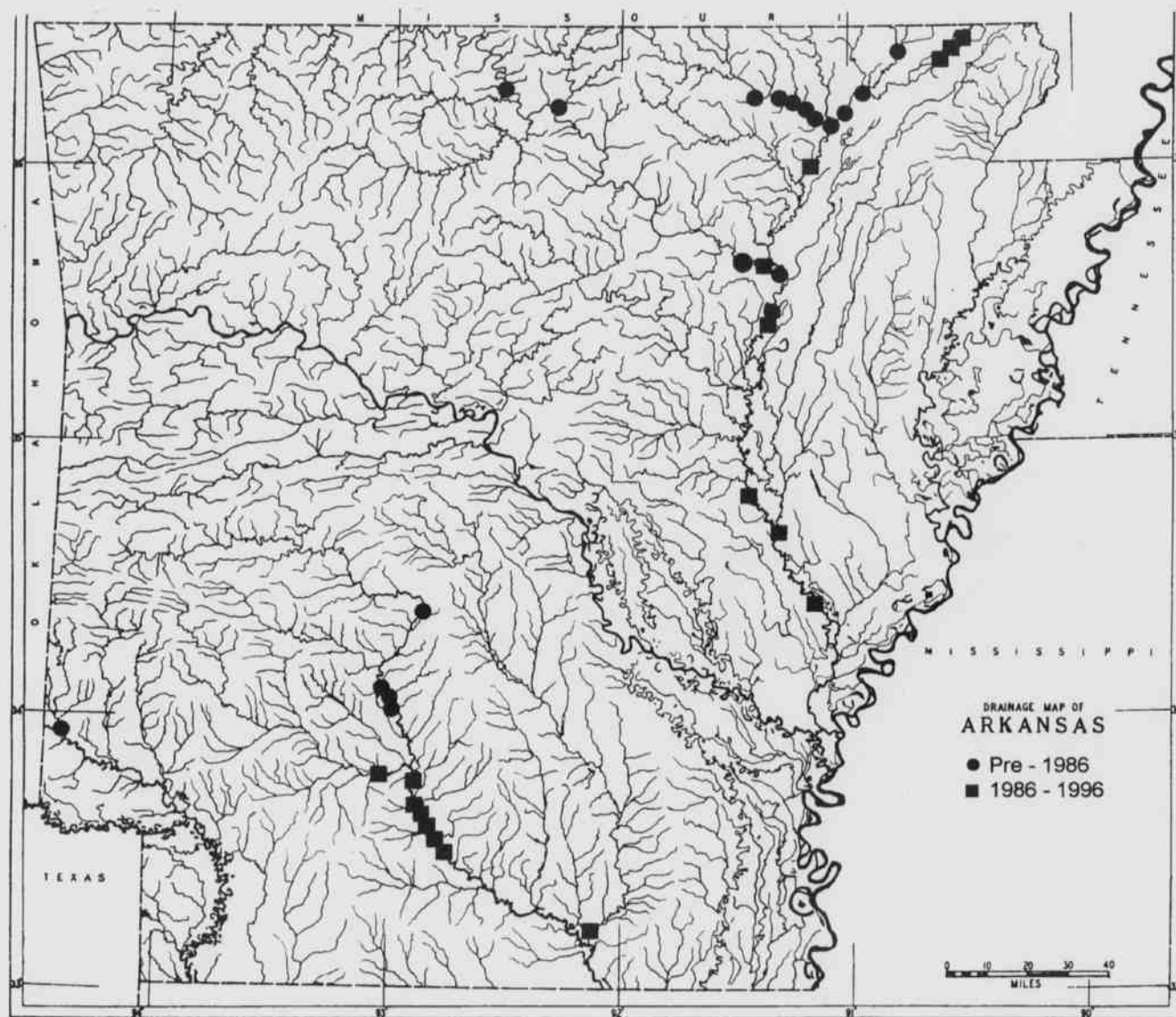


Fig. 2. Distribution of *Lampsilis abrupta*.

of Oil Trough, the White River near Old Grand Glaise, and the White River at DeValls Bluff.

*Lampsilis abrupta* population numbers appear stable but low in the Black, Ouachita, and Spring rivers. Gravel dredging, reservoir discharges and maintenance of existing navigation channels continue as threats to the species. The White River Navigation project has been reauthorized (Corps of Engineers, 1996) and, if constructed and maintained, poses a potential threat to the continued existence of the pink mucket within the White River, Arkansas. However, at the present time, the authors feel that revising

the conservation status of the pink mucket within Arkansas to threatened is appropriate.

*Lampsilis powelli* (Lea, 1852) - Arkansas fatmucket. Distribution: Figure 3. STATUS: National and State - Threatened.

*Lampsilis powelli* is an Arkansas endemic which Harris and Gordon (1987) listed as threatened within Arkansas. Harris and Gordon (1988) performed the status survey for the Arkansas fatmucket, and the species was subsequently listed as threatened by the U.S. Fish and Wildlife Service (1990). A recovery plan has been prepared for the Arkansas

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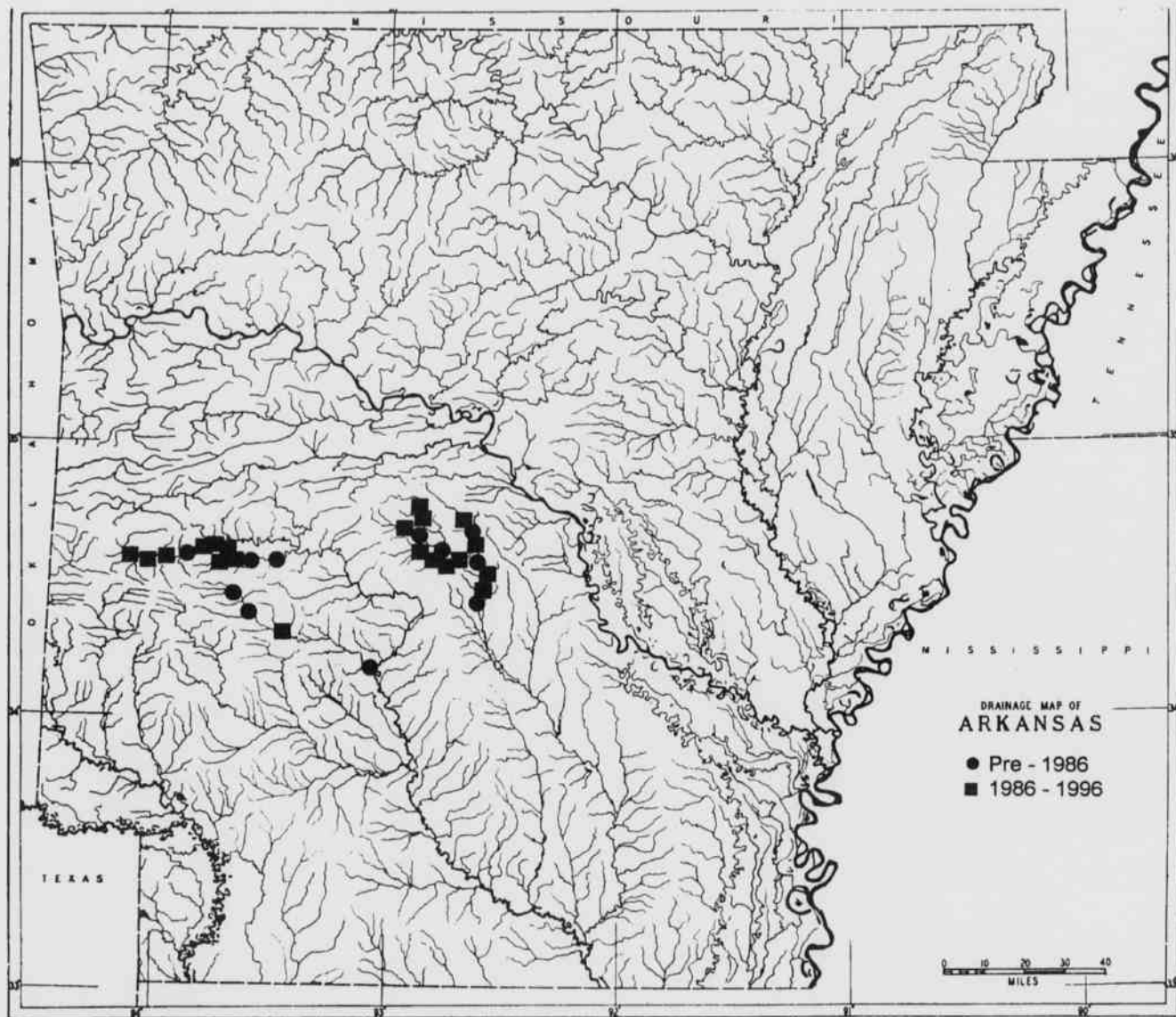


Fig. 3. Distribution of *Lampsilis powelli*.

fatmucket (U.S. Fish and Wildlife Service, 1992). Additional surveys and habitat characterizations are reported by Brown and Brown (1989), Burns & McDonnell (1992a, 1992b), Harris (1989c, 1991a, 1994a), and Harris et al. (1992).

The Arkansas fatmucket is known to occur in the Caddo River upstream and downstream of DeGray Lake, upper Ouachita River and South Fork Ouachita River upstream of Lake Ouachita, and the Alum, Middle, North and South forks of the Saline River, as well as the mainstem Saline River downstream to approximately the boundary of the Interior Highlands and Gulf Coastal Plain. Surveys

performed by Burns & McDonnell (1992a, 1992b) documented the presence of *Lampsilis powelli* in the North and South forks Saline River and the upper Ouachita River. The three largest Arkansas fatmucket populations occur in the Alum and Middle forks Saline River and the South Fork Ouachita River (5,000-10,000 estimated individuals each) with additional important populations existing in the upper Ouachita River and the mainstem Saline River (1,000-5,000 estimated individuals each) (Burns & McDonnell, 1992b).

Siltation and sedimentation (Harris and Gordon, 1988; Brown and Brown, 1989) and a lack of recruitment (Harris



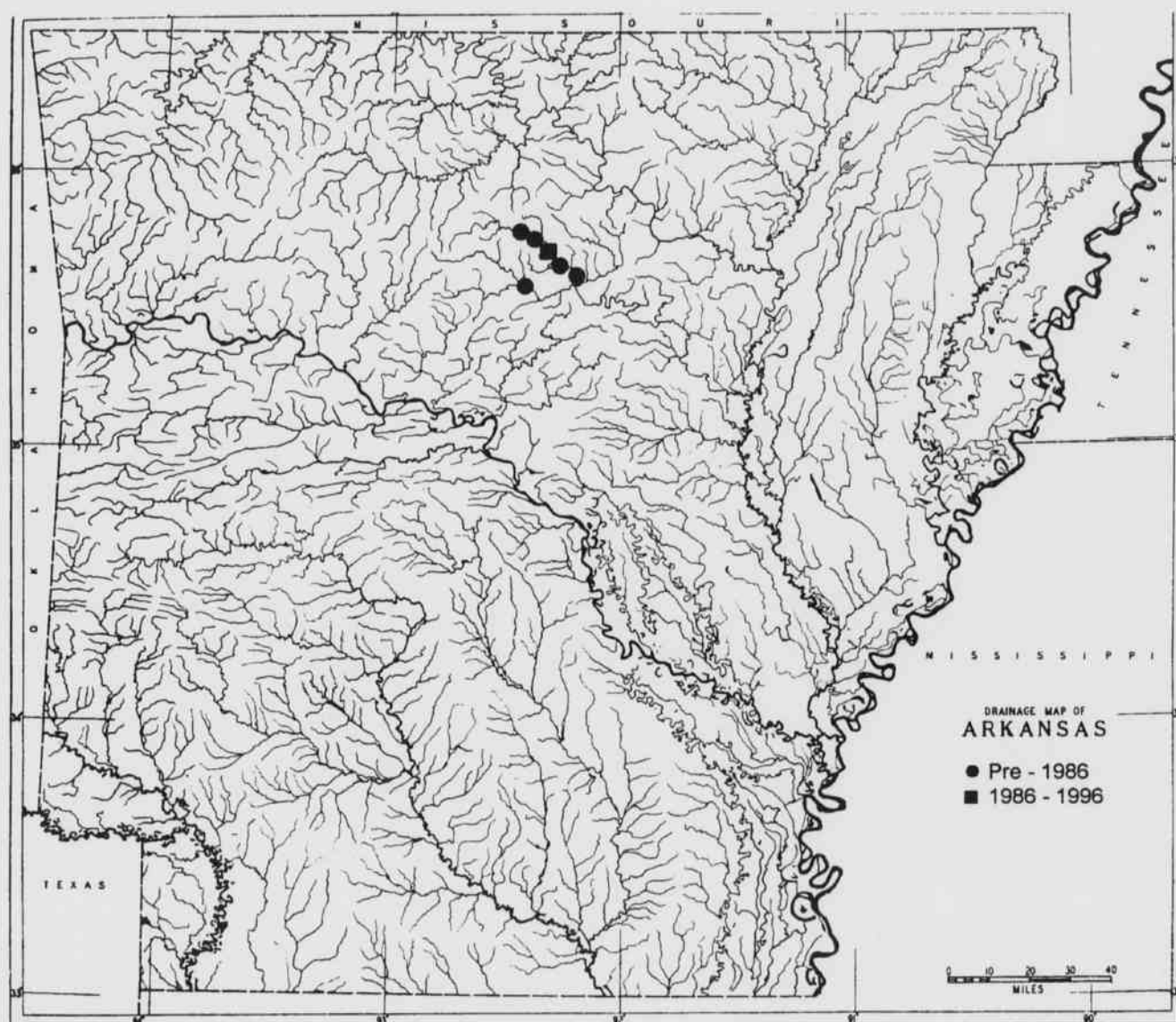


Fig. 4. Distribution of *Potamilus streckeri*.

1994a) have been identified as contributors to the threatened status of this species. *Lampsilis powelli* may have been the most intensively studied unionacean species in Arkansas over the past 10 years.

*Lampsilis streckeri* Frierson 1927 - speckled pocketbook. Distribution: Figure 4. STATUS: National and State - Endangered.

Harris and Gordon (1987) listed the status of the speckled pocketbook as uncertain because of taxonomic confusion. Clarke (1987) concluded that *Lampsilis streckeri* was a valid taxon with its distribution restricted to approximately

14 km of the Middle Fork Little Red River. The U.S. Fish and Wildlife Service (1989) listed the speckled pocketbook as endangered, and a recovery plan has been prepared (U.S. Fish and Wildlife Service, 1991).

Additional surveys and habitat characterizations were reported by Harris (1991b, 1992a, 1992c, 1993). Harris (1992a) extended the known range of *Lampsilis streckeri* to approximately 19.4 km of the Middle Fork Little Red River and also determined that the speckled pocketbook was successfully inhabiting sandy substrates under slab rock (Harris, 1993).

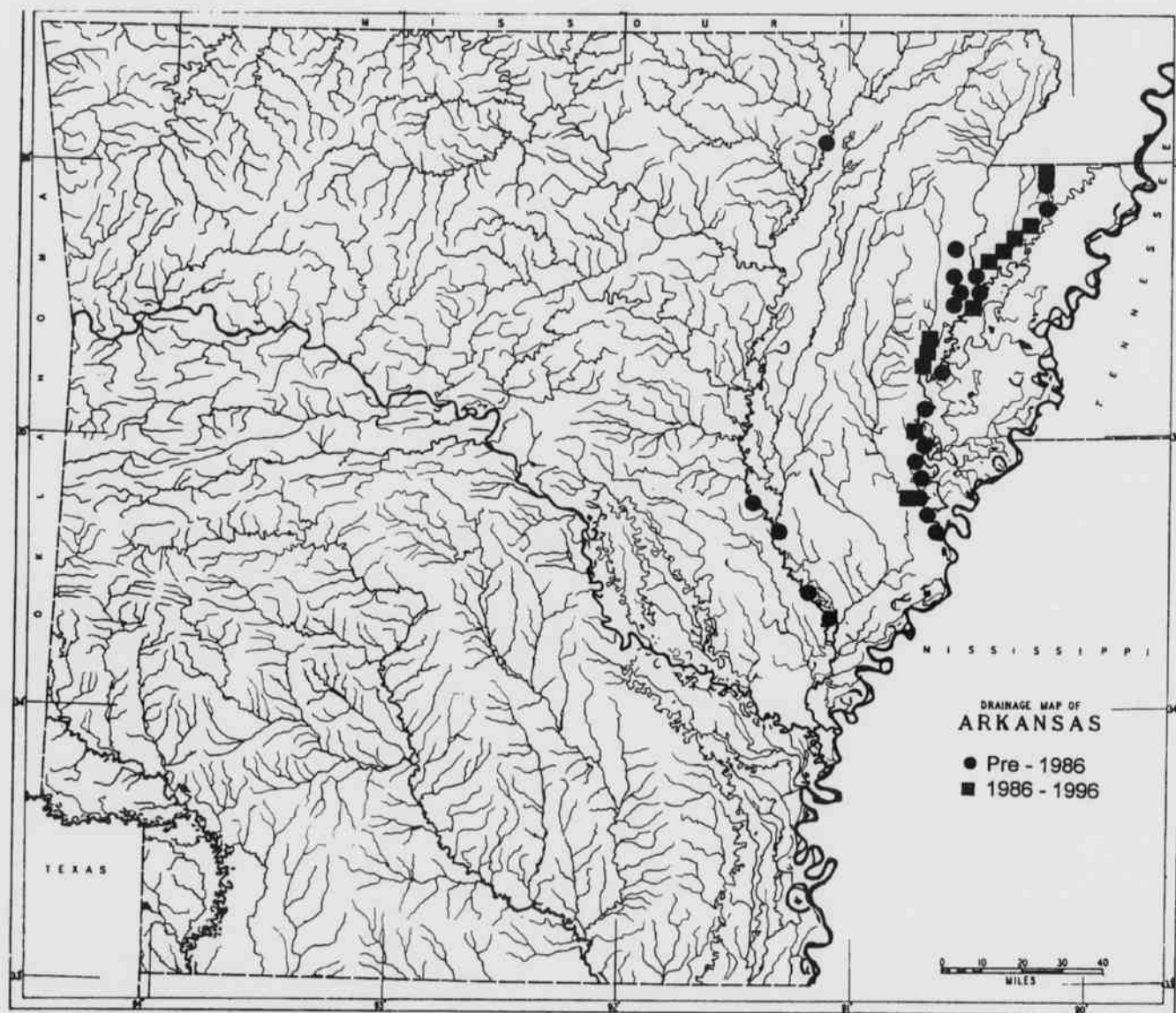


Fig. 5. Distribution of *Potamilus capax*.

Distribution and abundance of the speckled pocketbook has been impacted negatively by alteration of habitat due to impoundment of the Little Red River to form Greers Ferry Reservoir, flood control projects (channelization), instream gravel mining, and timber harvest (Clarke, 1987; U.S. Fish and Wildlife Service, 1992; Harris, 1993).

*Potamilus capax* (Green, 1832) -fat pocketbook. Distribution: Figure 5. STATUS: Federal - Endangered, State - Threatened.

Since Harris and Gordon (1987), an additional unionacean survey that encompassed 256 sites in the Cache

and St. Francis river drainages was completed by Jenkinson and Ahlstedt (1987). This survey targeted many man-made ditches and smaller streams that were not surveyed by Ahlstedt and Jenkinson (1987). Additional small scale surveys for the fat pocketbook have been performed by Harris (1990a, 1990b, 1997a), and Jenkinson (1989) reported the results of a relocation of *Potamilus capax* from a 6.4-km reach of the St. Francis Floodway prior to dredging for flood control. Ahlstedt and Jenkinson (1991) summarized the available information regarding the distribution and abundance of *Potamilus capax* in the St. Francis River system. Thirty-

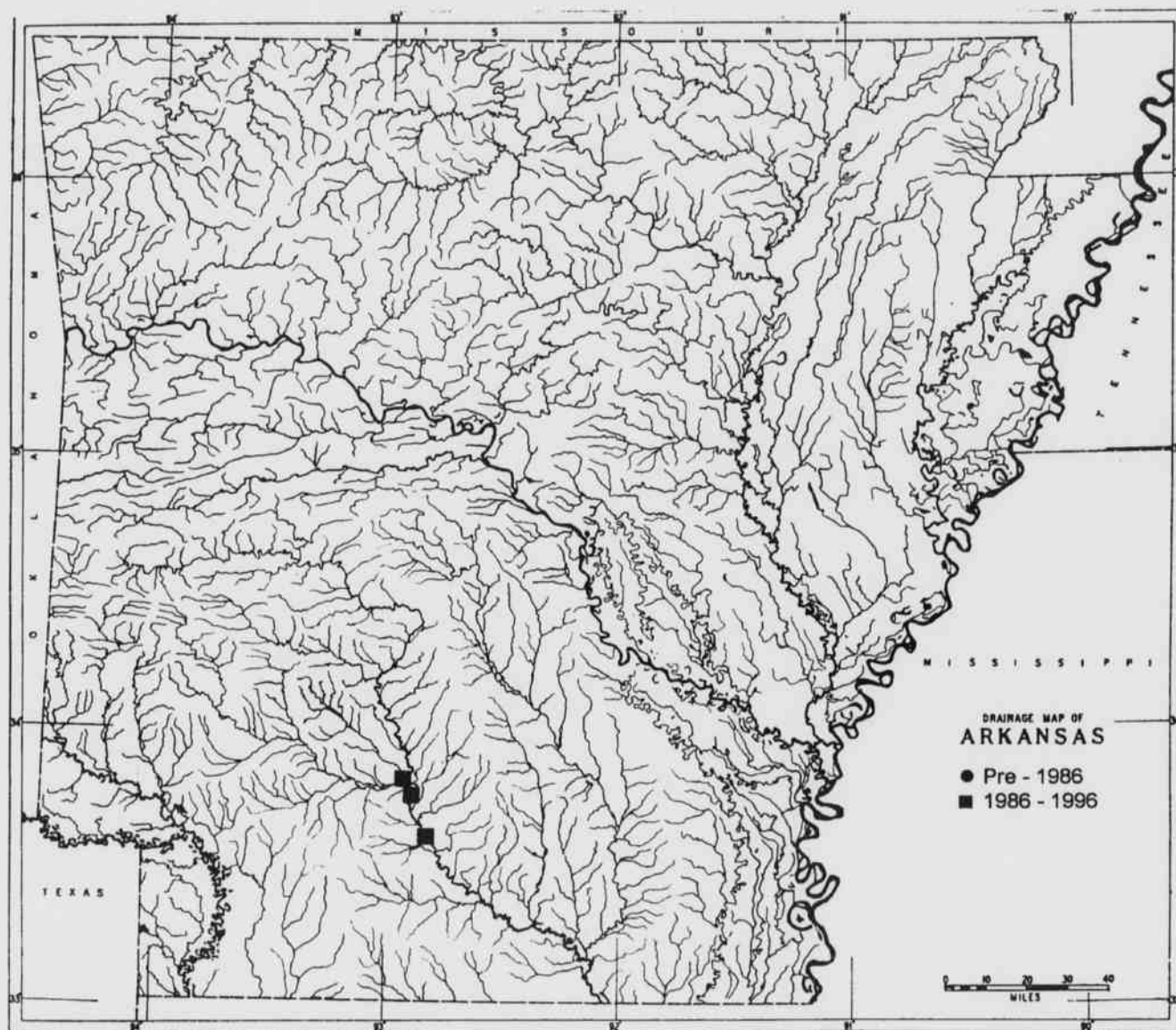


Fig. 6. Distribution of *Quadrula fragosa*.

three fat pocketbook individuals were collected at 10 riverine sites and 109 individuals were found at 14 ditch sites in Arkansas.

Jenkinson and Ahlstedt (1987) found the fat pocketbook in a downstream reach of the L'Anguille River and at many sites within man-made ditches and low order tributaries to the St. Francis floodway. The number of new sites and relative abundance of the fat pocketbook at these sites leads the authors to revise the conservation status of the fat pocketbook within Arkansas from endangered to threatened.

*Quadrula fragosa* (Conrad, 1835) - winged mapleleaf.

Distribution: Figure 6. STATUS: National and State - Endangered.

Posey et al. (1996) recently discovered the presence of the winged mapleleaf within Arkansas where it is known to occur at three sites; two in the Ouachita River upstream of Camden, Ouachita County, and one in the Little Missouri River near its confluence with the Ouachita (Davidson, 1997). A total of seven specimens of *Quadrula fragosa* is known now from Arkansas.



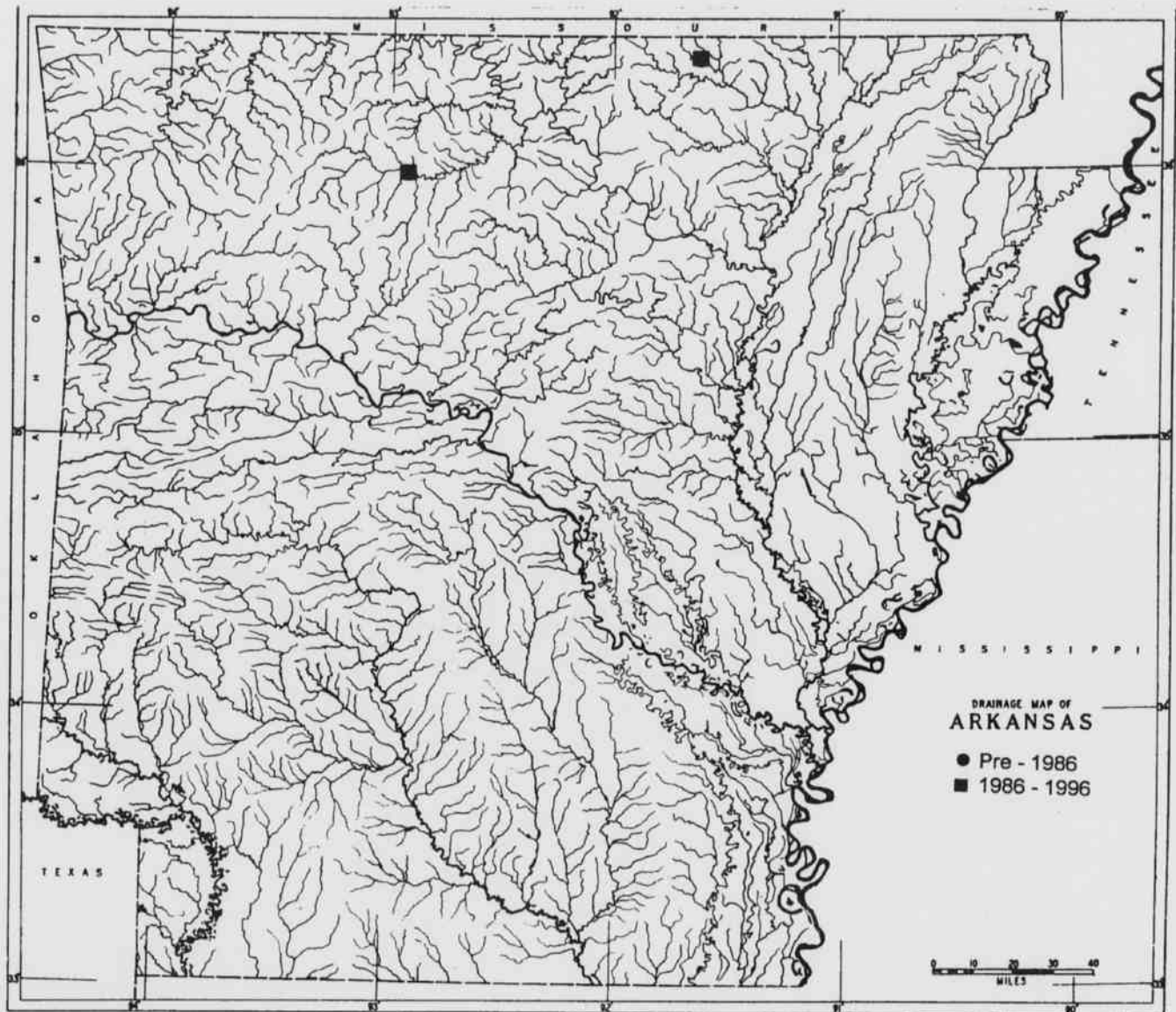


Fig. 7. Distribution of *Alasmidonta viridis*.

### Other Species of State Concern

*Alasmidonta viridis* (Rafinesque, 1820) - slippershell mussel. Distribution: Figure 7. STATUS: State-Endangered.

Meek and Clark (1912) recorded the slippershell mussel from the Buffalo River, and Gordon et al. (1980) listed it (as *Alasmidonta calceolus*) from the Buffalo and White rivers. Harris (1996) found a total of two live and one fresh dead specimens at two of 41 survey sites in the Buffalo River, and Davidson et al. (1997) recorded a single relict specimen from Myatt Creek in the Spring River drainage. This species

was not considered for conservation status listing by Gordon and Harris (1987).

*Cumberlandia monodonta* Say, 1829 - spectaclecase. Distribution: Figure 8. STATUS: State Endangered.

Harris and Gordon (1987, 1990) considered the spectaclecase as possibly extirpated from Arkansas since no live or relict specimens had been recorded since Wheeler (1918). Posey et al. (1996) rediscovered the spectaclecase in the Ouachita River at River Miles 364.1 and 375.1, and each site was represented by a single live individual. Stoeckel et al. (1996) discovered the spectaclecase at a single site in the

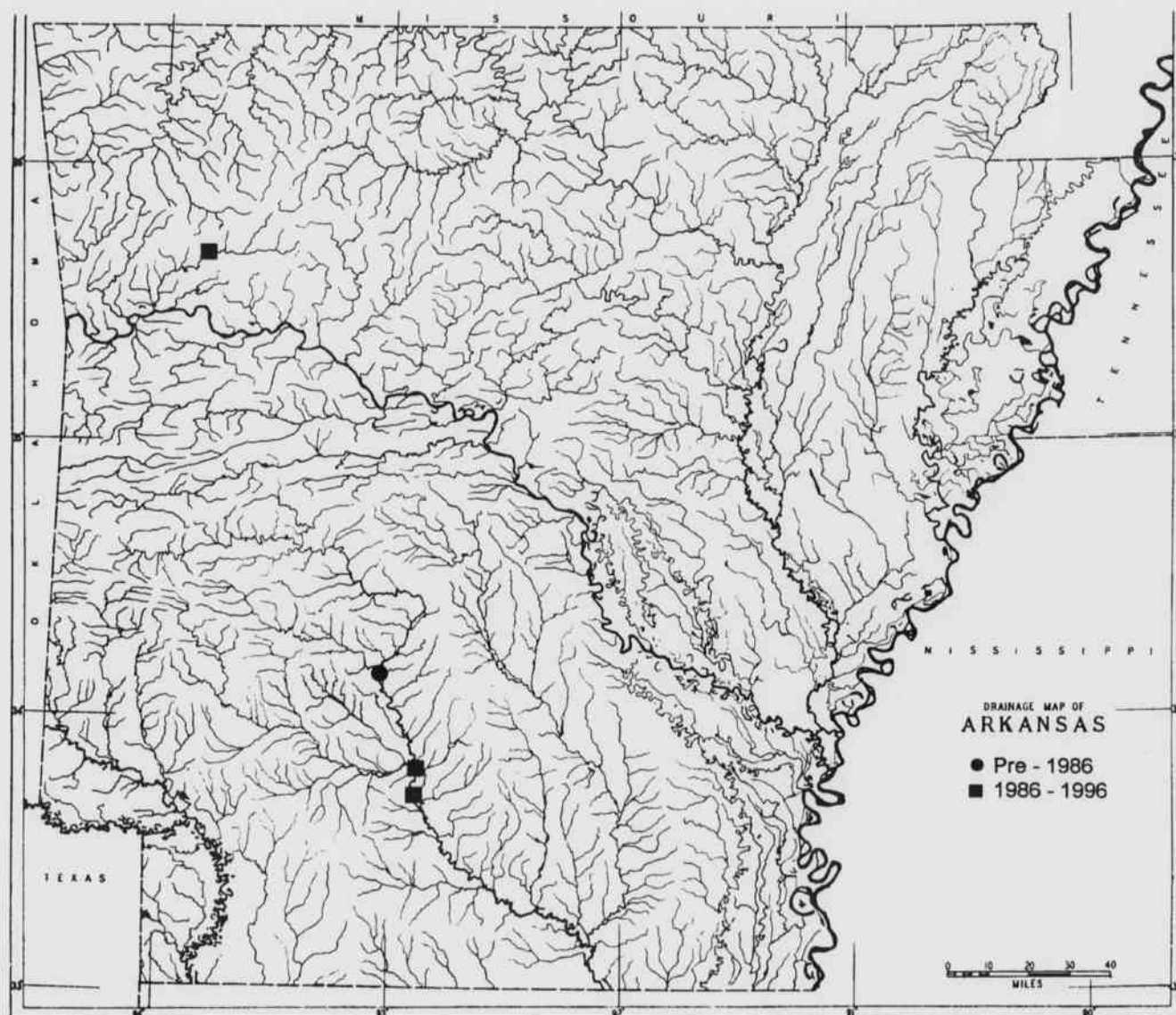


Fig. 8. Distribution of *Cumberlandia monodonta*.

Mulberry River, and this discovery also was represented by a single live individual.

*Epioblasma triquetra* (Rafinesque, 1920). Distribution: Harris and Gordon (1987). STATUS: State - Endangered

No additional data have been acquired since Harris and Gordon (1987).

*Potamilus alatus* (Say, 1817) - pink heelsplitter. Distribution: Harris and Gordon (1987). STATUS: State - Endangered.

No additional data have been acquired since Harris and Gordon (1987).

*Simpsonaias ambigua* (Say, 1825) - salamander mussel. Distribution: Harris and Gordon (1987). STATUS: Endangered.

No additional data have been acquired since Harris and Gordon (1987). Originally listed as threatened within Arkansas by Harris and Gordon (1987), the lack of additional sites or specimens in the ensuing 10 years prompts revision of the conservation status to endangered.

*Lampsilis rafinesqueana* Frierson, 1927 - Neosho musket. Distribution: Harris and Gordon (1987). STATUS: State - Threatened.



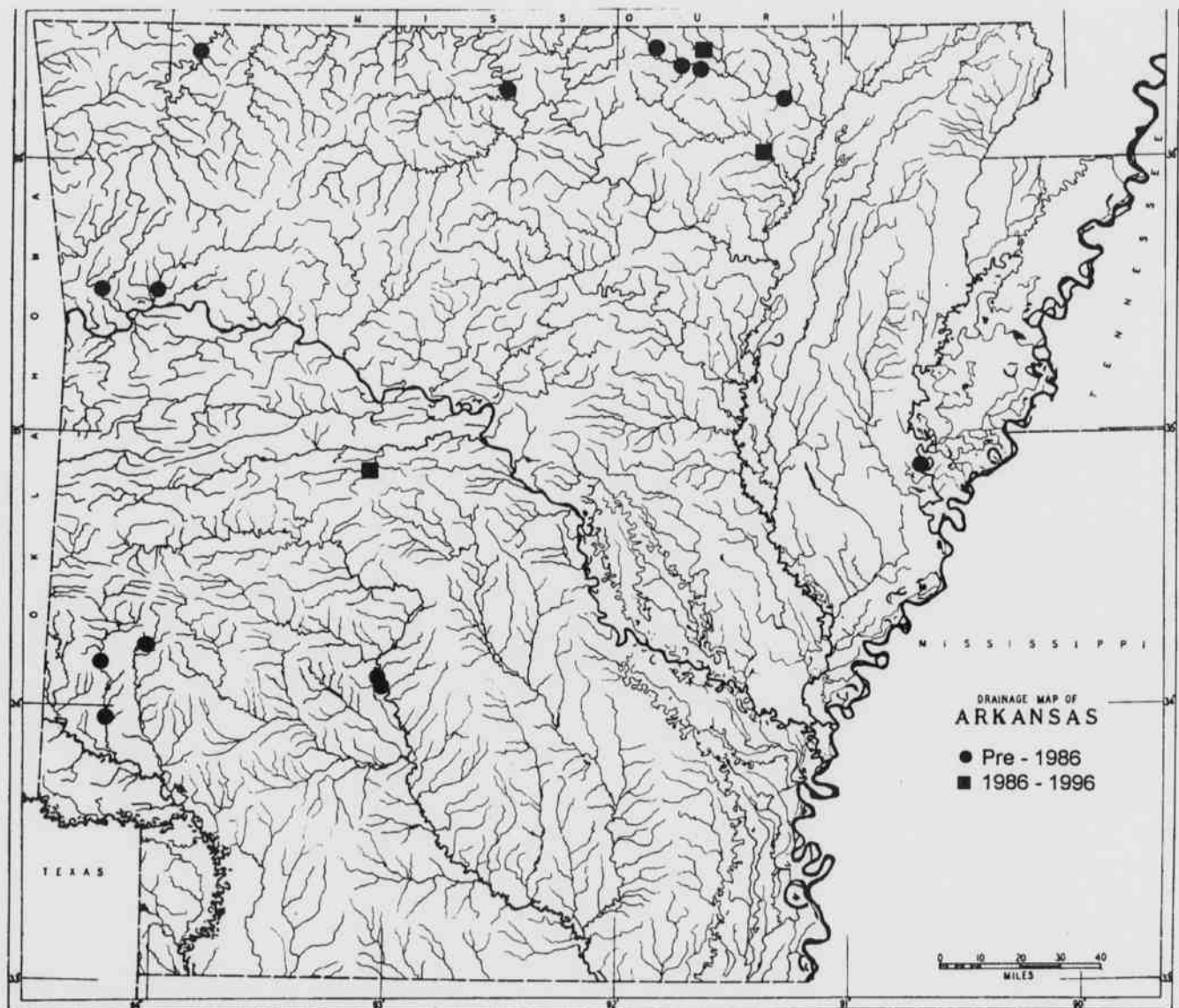


Fig. 9. Distribution of *Leptodea leptodon*.

The distribution of this species remains as reported in Harris and Gordon (1987). Harris (1991d) performed a small scale survey for the Neosho mucket in the Illinois River near the Arkansas - Oklahoma state line, and three live specimens were found. A status survey for the Neosho mucket within Arkansas was performed by Harris (1997b), and the species was found to be locally abundant in the mainstem of the Illinois River. The Neosho mucket was present at 18 of 22 sites searched, and 148 specimens were found which represented 11.9% of the unionaceans examined.

*Leptodea leptodon* (Rafinesque, 1820) - scaleshell.  
Distribution: Figure 9. STATUS: State - Threatened.

Since Harris and Gordon (1987), the scaleshell has been found at single sites in the South Fork Fourche La Pave River (Harris 1992b) and Myatt Creek (Davidson et al., 1997). Recent collections by authors JLH and ADC yielded two specimens (one live, one dead) from two sites in the Strawberry River. The species remains widely distributed but rare within Arkansas.

*Quadrula apiculata* (Say, 1829) - southern mapleleaf.

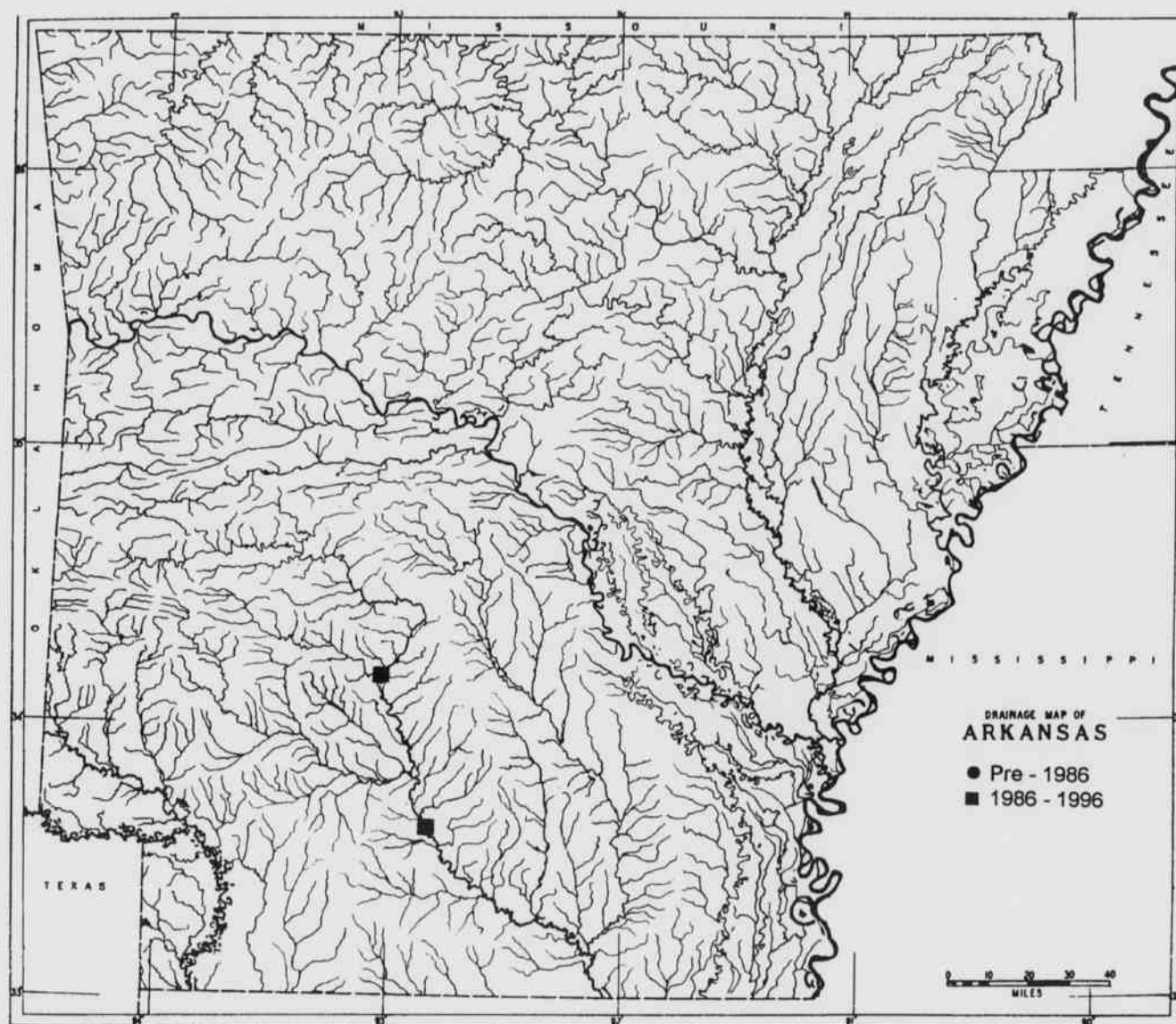


Fig. 10. Distribution of *Quadrula apiculata*.

Distribution: Figure 10. STATUS: Threatened.

Posey et al. (1996) reported that the southern mapleleaf was collected at multiple sites in the Ouachita River between River Miles 353.7 and 221.2. The species may also occur in the Ouachita River (Wheeler, 1918) and Lake Chicot (Cooper, 1984). A specimen referable to *Quadrula apiculata* was recently collected in the White River near DeValls Bluff. The conservation status of this species within Arkansas was not discussed by Harris and Gordon (1987).

*Anodonta suborbiculata* Say, 1831 -flatfloater. Distribution: Figure 11. STATUS: Special Concern.

Ahlstedt and Jenkins (1991) collected five specimens of the flat floater from three river sites and 18 specimens from six ditch sites within the St. Francis River system in Arkansas. Davidson (1997) found this species to be widespread but relatively uncommon in Ozark Lake and Lake Dardanelle within the Arkansas River Navigation System. Harris (1989b, 1991c) and Harris et al. (1993) found the flat floater to comprise a minor portion of the unionacean community at specific sites in the Ouachita River, Lake Dardanelle, and Lake Chicot, respectively. Surveys of oxbows, backwaters, and larger river systems should contin-

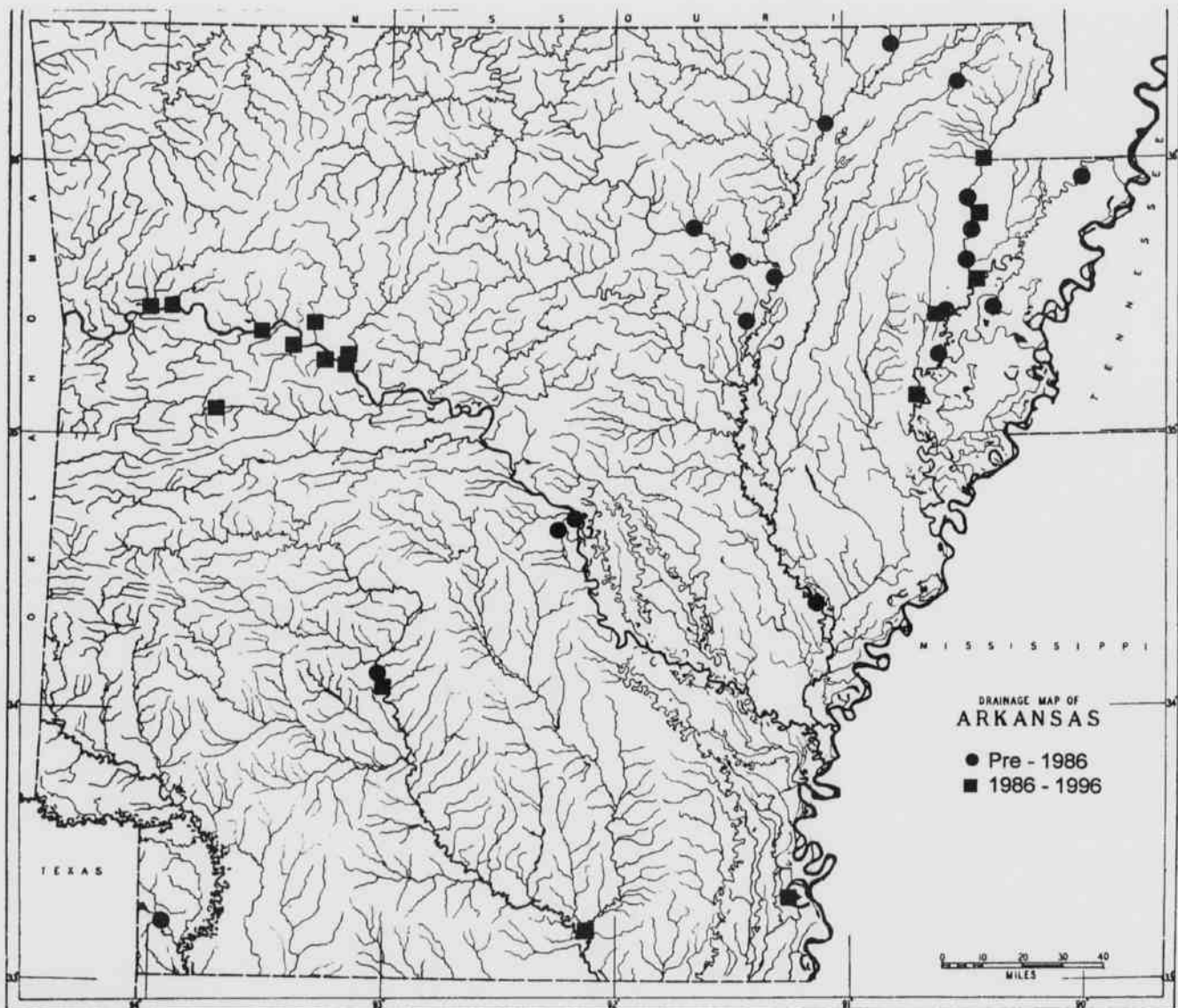


Fig. 11. Distribution of *Anodonta suborbiculata*.

ue to yield additional localities where this species exists.

*Cyprogenia aberti* (Conrad, 1850) - western fanshell. Distribution: Figure 12. STATUS: State - Special Concern.

Christian (1995) found *Cyprogenia aberti* at three of 51 unionacean aggregations in the White River, but the western fanshell was not found in the Cache River. Rust (1993) found the western fanshell at seven of 48 sites sampled in the Black River where it was locally abundant, comprising 5 - 10 percent of the total unionaceans encountered at River Miles 72.9 and 75.3. Also, Rust (1993) determined that the western fanshell composed 4.4 - 10.1 percent of the total

unionacean community at three major aggregations in the Spring River. Posey (1997) found the western fanshell at five of 61 unionacean aggregations in the Ouachita River, and a total of seven live individuals was examined. Additional sites for *Cyrogenia aberti* were located by Harris and Gordon (1988) and Burns & McDonnell (1992b) in the Ouachita and Saline rivers, Ahlstedt and Jenkinson (1991) in the St. Francis River drainage, Davidson (1997) in the Little Missouri River, and Harris (1996) in the Buffalo River. Also, the western fanshell has been found at nine of 24 sites during recent surveys of the Strawberry River. This species



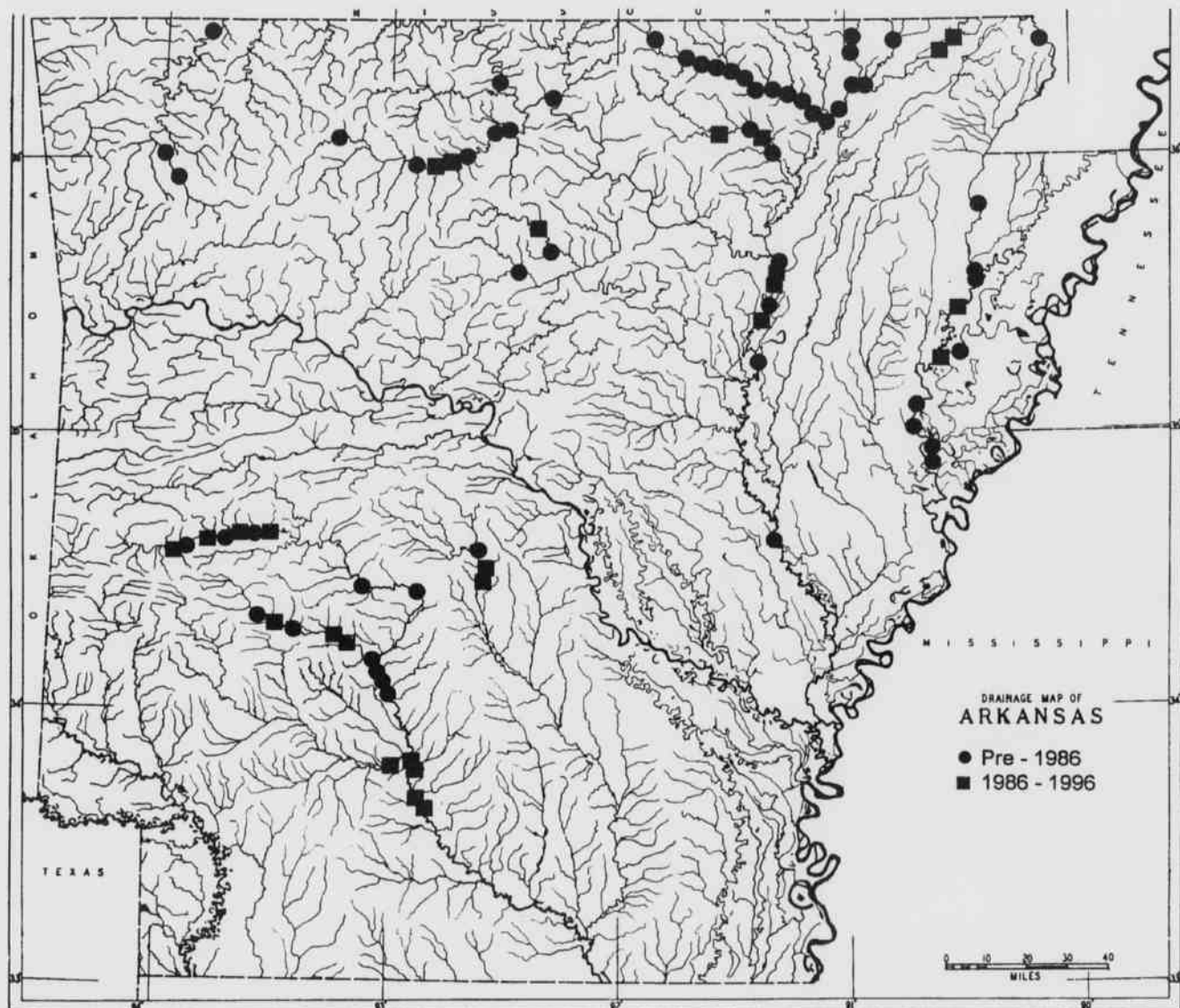


Fig. 12. Distribution of *Cyprogenia aberti*.

is widely distributed within Arkansas, can be locally abundant, but generally is found in relatively low numbers in high quality riverine systems.

*Obovaria jacksoniana* (Frierson, 1912) - southern hickorynut. Distribution: Figure 13. STATUS: State - Special Concern.

Harris and Gordon (1988), Burns & McDonnell (1992b), and Davidson (1997) found additional localities where the southern hickorynut survives in the Ouachita River system. Harris (1992b) collected a single individual from the South Fourche La Fave River (Arkansas River sys-

tem), and ADC and JLH found the southern hickorynut at two sites in the Strawberry River (White River system). The southern hickorynut is widely distributed but nowhere abundant, and it deserves to be listed as of special concern.

*Quadrula cylindrica cylindrica* (Say, 1917) - rabbitsfoot. Distribution: Figure 14. STATUS: State-Special Concern.

Harris and Gordon (1988), Harris (1989c), Burns & McDonnell (1992a, 1992b), Davidson (1997), and Posey (1997) have documented numerous additional localities for this species within the Ouachita River system. Rust (1993), and Christian (1995) have documented numerous addition-

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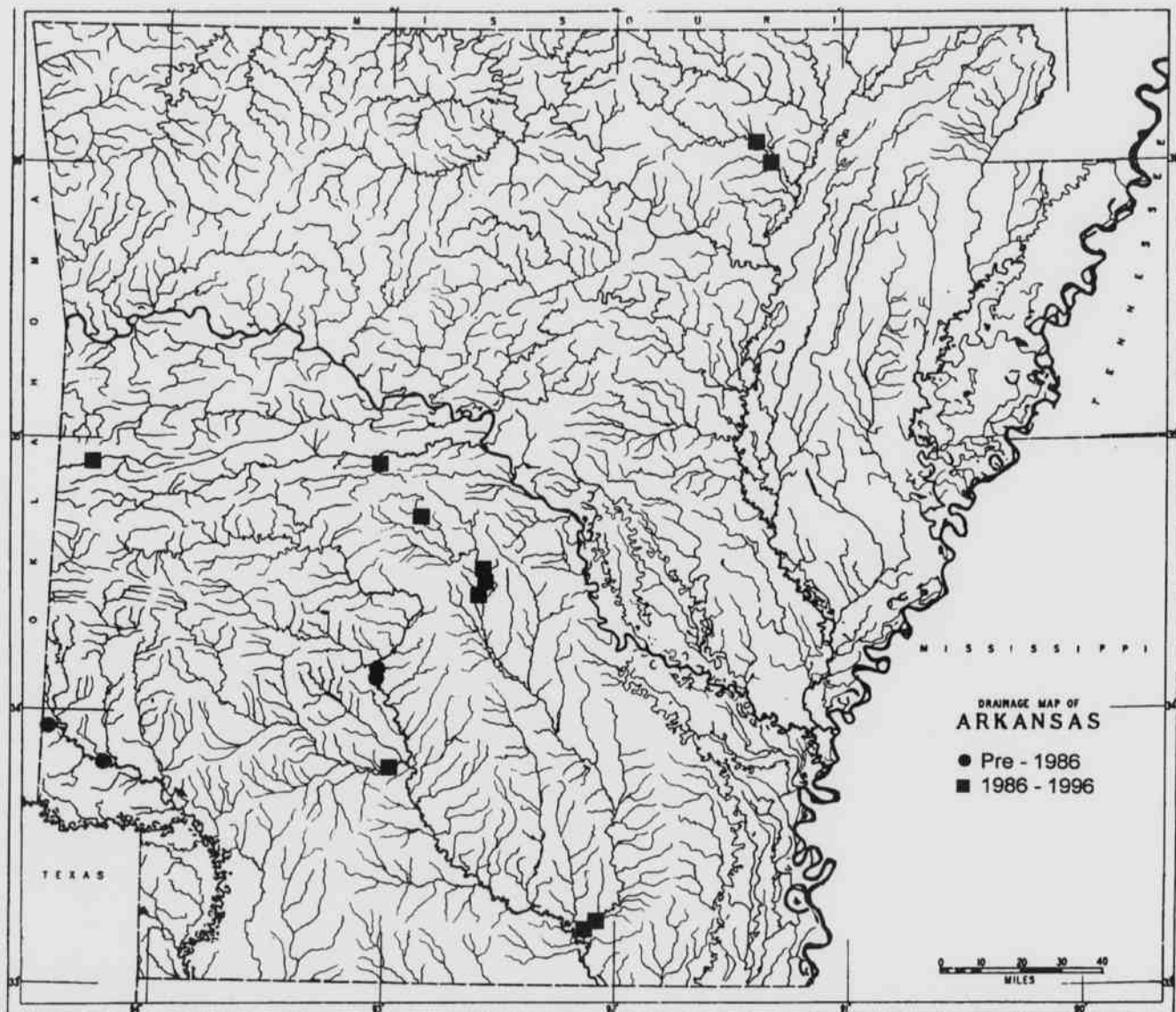


Fig. 13. Distribution of *Obovaria jacksoniana*.

al localities for this species within the White river drainages. Due to relatively low population numbers, this species is considered of special concern within Arkansas.

*Toxolasma lividus* (Rafinesque, 1831) - purple lilliput. Distribution: Figure 15. STATUS: State - Special Concern.

Harris and Gordon (1988), Burns & McDonnell (1992a, 1992b), and Davidson (1997) discovered the majority of new sites for this diminutive, headwater species, all from the Ouachita River system. Harris (1992b) found two specimens in the South Fourche La Fave River, Harris (1994b) discovered a single specimen in the Poteau River and Harris

(1997b) collected the purple lilliput at three sites in the Illinois River. The conservation status of this species was not addressed by Harris and Gordon (1987). Its relatively low population numbers dictate that it be considered of special concern within Arkansas.

*Villosa arkansasensis* (I. Lea, 1862) - Ouachita creekshell. Distribution: Figure 16. STATUS: State - Special Concern.

Harris and Gordon (1988) and Burns & McDonnell (1992a, 1992b) listed the majority of new occurrences for this headwater species whose center of distribution closely parallels that of the southern hickorynut in Arkansas. Three



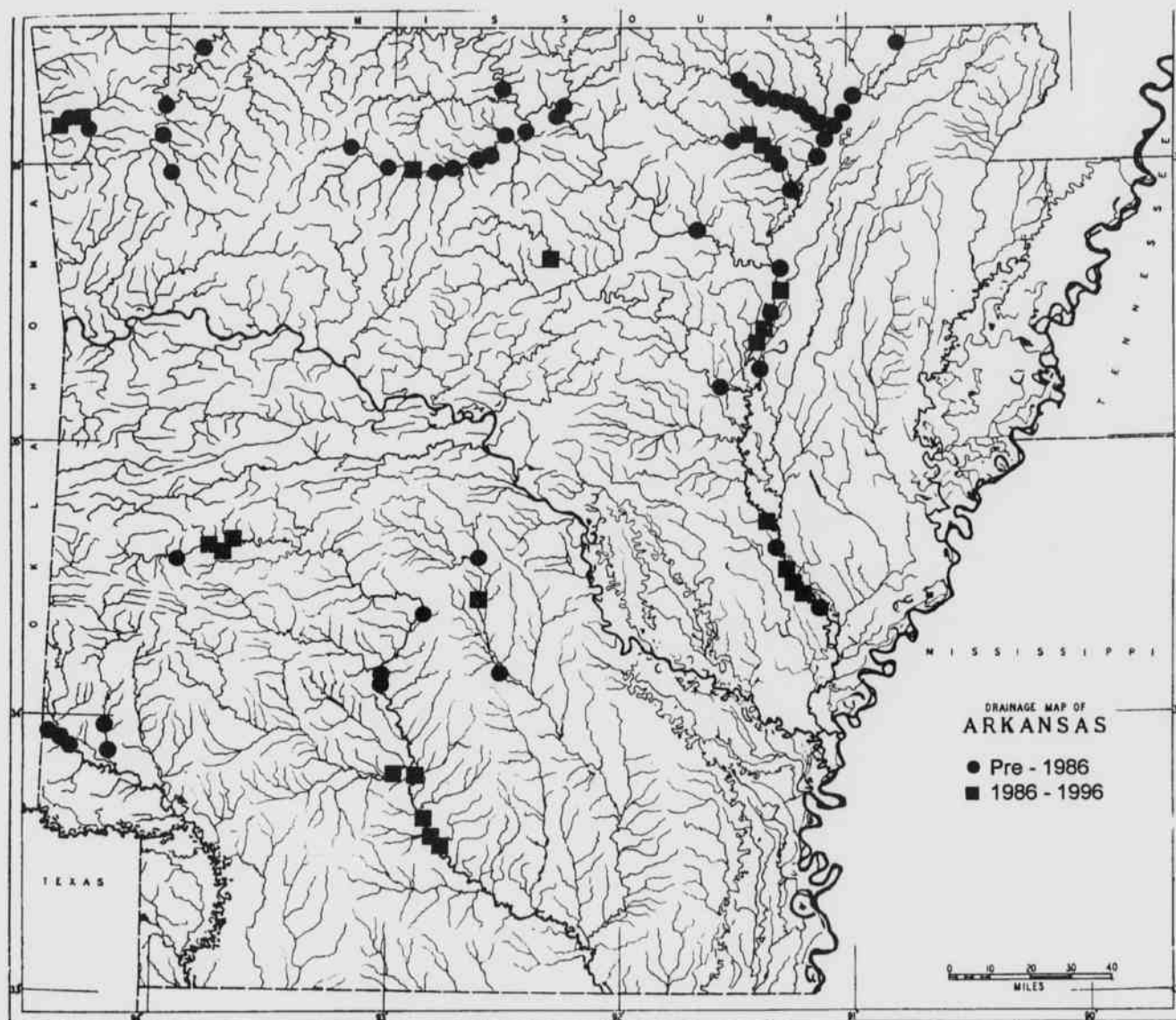


Fig. 14. Distribution of *Quadrula cylindrica cylindrica*.

specimens were collected at three sites in the Poteau River (Harris, 1994b). The conservation status of this species was not addressed by Harris and Gordon (1987). Its relatively low population numbers dictate that it be considered of special concern within Arkansas.

*Pleurobema pyramidatum* (I. Lea, 1840) - pyramid pigtoe. Distribution: Figure 17. STATUS: State - Currently Secure.

Distribution and relative abundance data acquired by Davidson (1997) and Posey (1997) for the Little Missouri, Ouachita and Saline rivers indicate the pyramid pigtoe is a widely distributed and often numerically dominant species

within these drainages. In the Ouachita River below the confluence with the Little Missouri River, Posey (1997) located the pyramid pigtoe in 44 of 61 unionacean aggregations sampled, and the 3445 specimens examined represented 14.7% of the total unionaceans sampled. From the confluence with the Little Missouri River (River Mile 377) downstream to River Mile 327 (approximately 25 river miles downstream of Camden, AR), the pyramid pigtoe represented 5.3 - 53.3 percent (mean = 27.0) of the unionacean community within 23 aggregations quantitatively sampled (Posey, 1997). Ahlstedt and Jenkinson (1991) have summa-

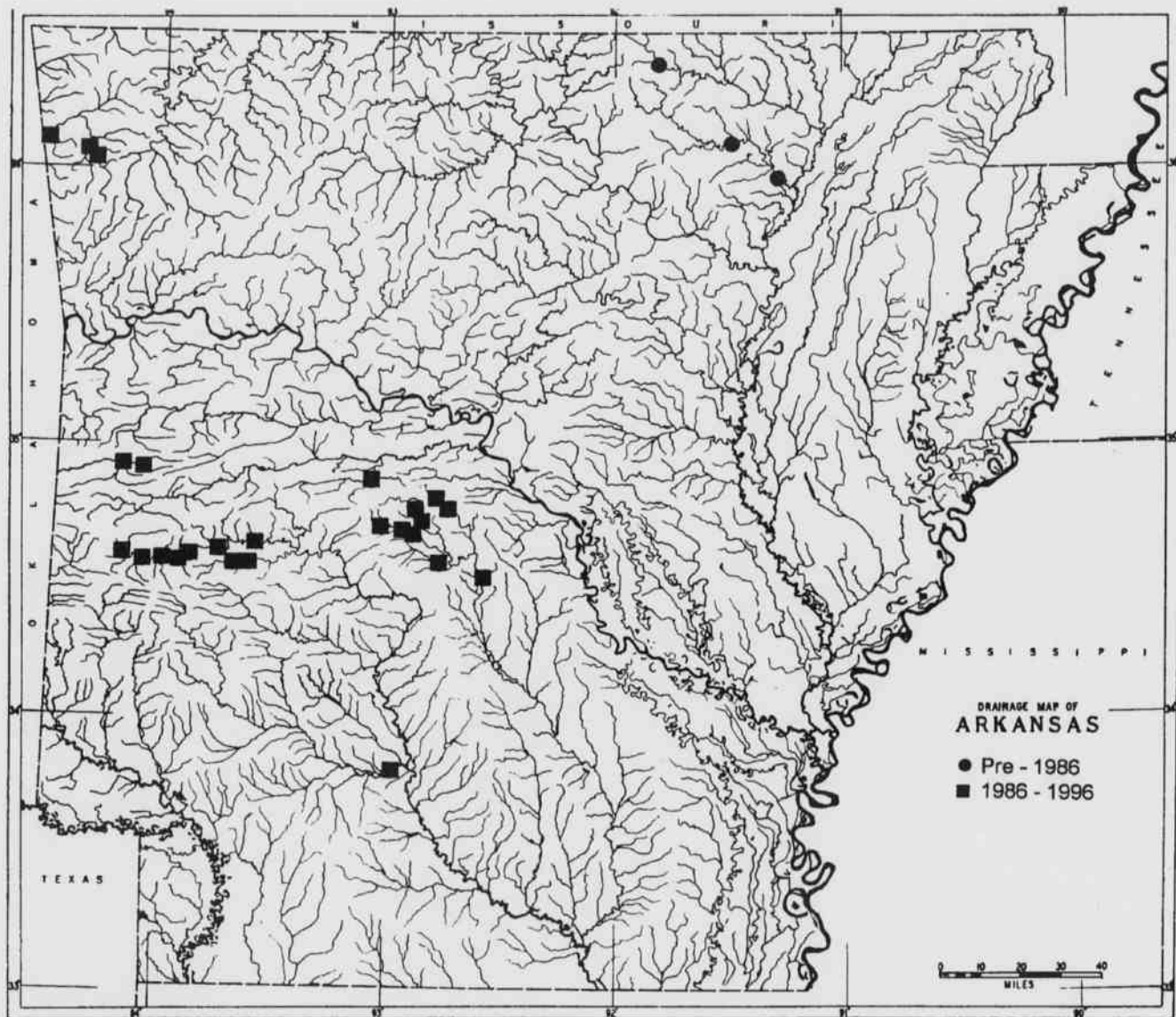


Fig. 15. Distribution of *Toxolasma lividus*

rized the distribution of the pyramid pigtoe within the St. Francis River drainage where a total of 78 specimens, which represented 0.6% of total riverine unionaceans examined, was found at 12 sites.

*Lampsilis ornata* (Conrad) - southern pocketbook. Distribution: Harris and Gordon, (1987). STATUS: State - Uncertain.

Harris and Gordon (1987) listed this species as *Lampsilis excavata* (Lea, 1857). No additional data have been acquired since Harris and Gordon (1987), and the taxonomic status of specimens referred to as this species is uncertain.

### Conclusions

Twenty-two of the 75 unionacean bivalve species (29.3%) considered native to Arkansas deserve conservation status listing. Seven species are listed as federally endangered, and these include *Arkansia wheeleri*, *Epioblasma florentina curtisi*, *E. turgidula*, *Lampsilis abrupta*, *L. streckeri*, *Potamilus capax*, and *Quadrula fragosa*. Additionally, *Lampsilis powelli* is listed as federally threatened.

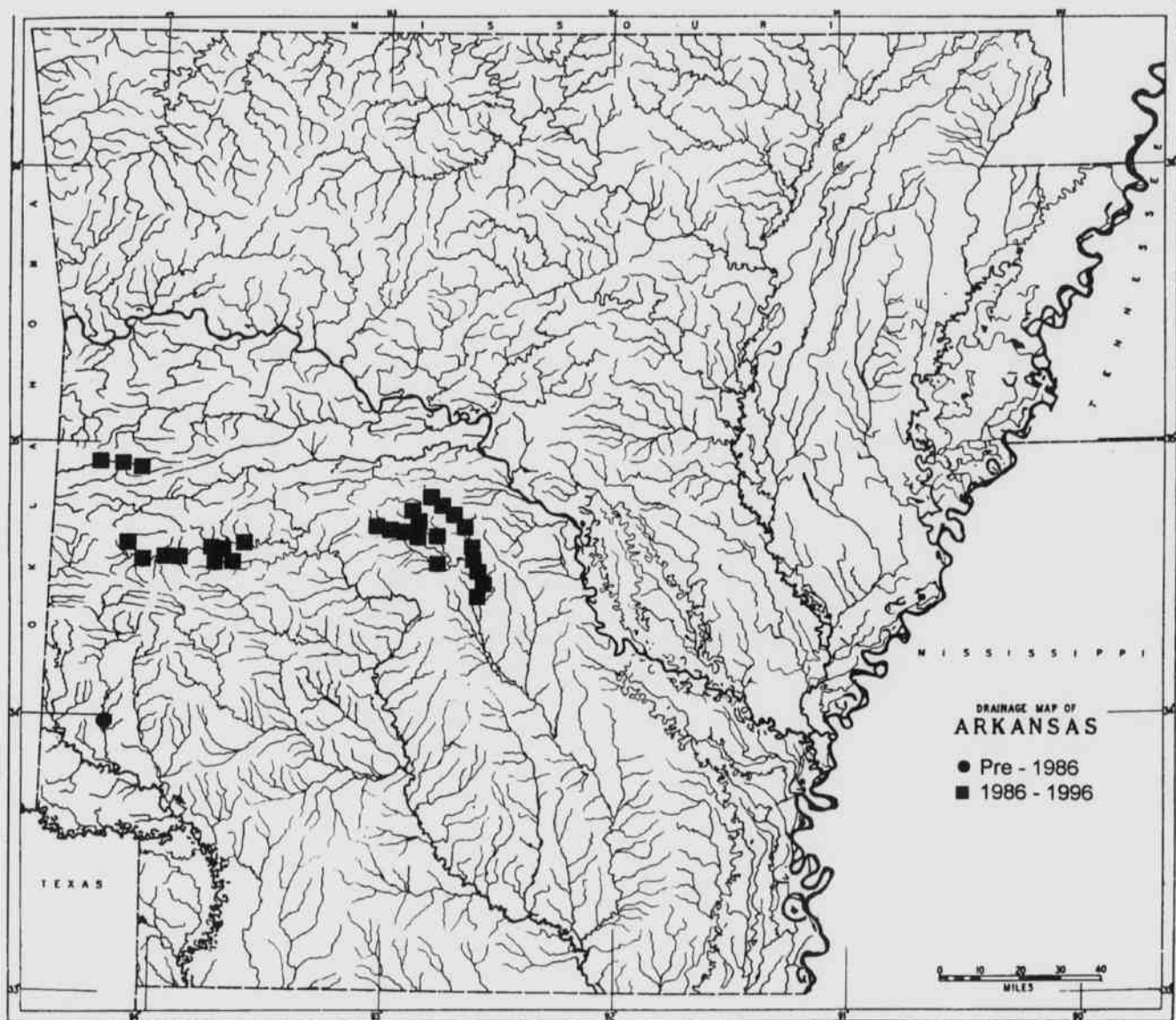


Fig. 16. Distribution of *Villosa arkansasensis*.

Ten unionacean species are herein listed endangered within Arkansas, and two of these, *Epioblasma florentina curtisi* and *E. turgidula*, may be extirpated from the state. Seven additional unionaceans are viewed as threatened and six others appear to warrant special concern. Four species listed as endangered, threatened or special concern in Arkansas are considered currently stable in North America (Williams et al., 1993). Two of these species, *Quadrula apiculata*, and *Potamilus alatus*, are on the periphery of their ranges in Arkansas. The third, *Anodonta suborbiculata*, inhabits waters that are difficult to survey so that our current understanding of its relative abundance and distribution may be underesti-

mated.

The remaining 20 unionaceans afforded conservation status listing within Arkansas are considered worthy of concern rangewide also (Williams et al., 1993). Ten Arkansas unionaceans received conservation listing due to restricted distribution. These species include *Alasmidonta viridis*, *Arkansia wheeleri*, *Cumberlandia monodonta*, *Epioblasma florentina curtisi*, *E. triquetra*, *E. turgidula*, *Lampsilis rafinesqueana*, *L. streckeri*, *Quadrula fragosa*, and *Simpsonaias ambigua*. All ten species have restricted distributions with extant populations limited to one or two river drainages. In addition to the potentially extirpated species previously discussed,



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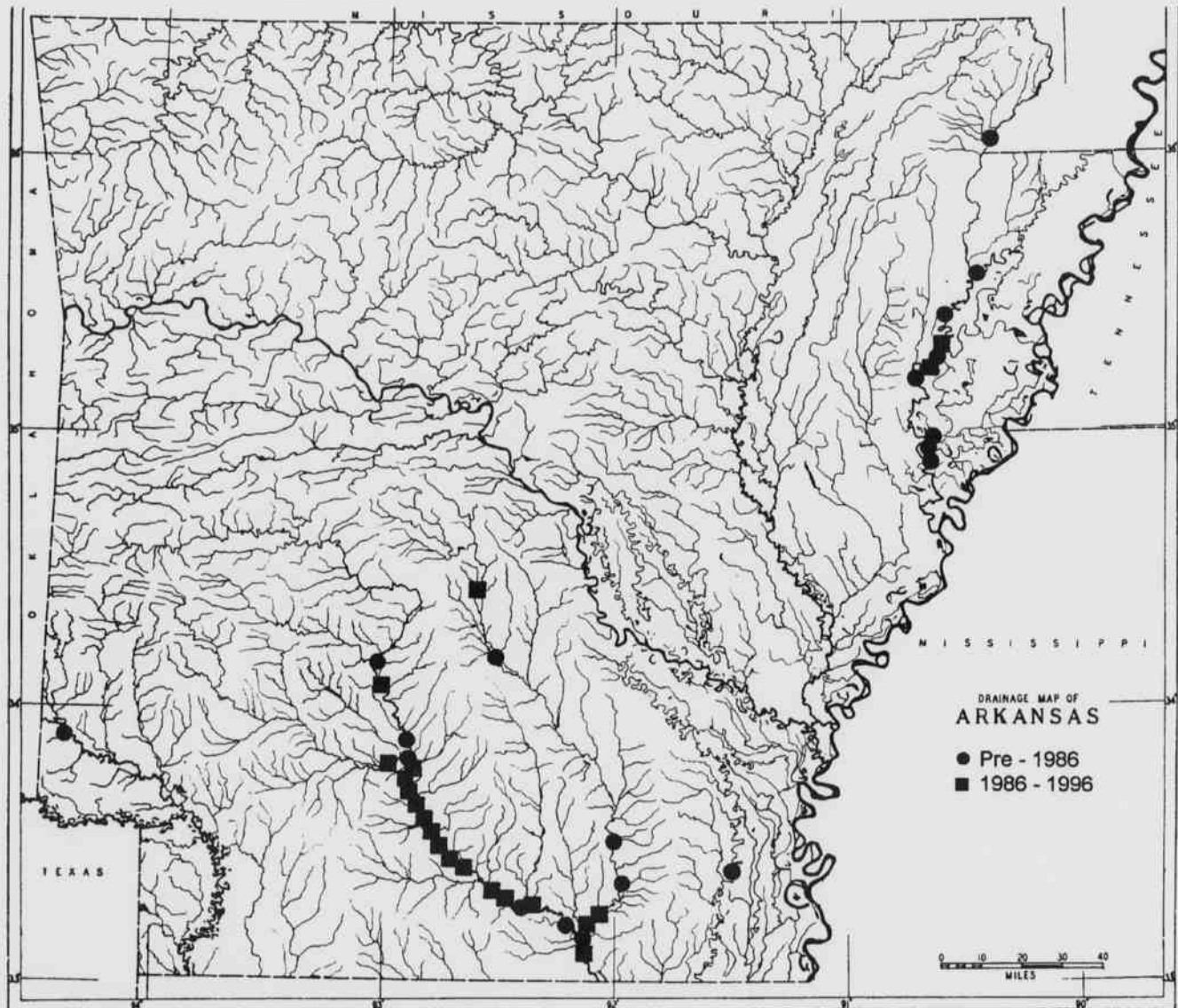


Fig. 17. Distribution of *Pleurobema pyramidatum*.

*Alasmidonta viridis*, *Arkansia wheeleri*, *Cumberlandia monodonta*, and *Simpsonia ambigua* are known from three or fewer localities.

The remaining nine species are widely distributed but typically occur in very low numbers at each site. These species include *Lampsilis abrupta*, *L. powelli*, *Potamilus capax*, *Cyprogenia aberti*, *Leptodea leptodon*, *Obovaria jacksoniana*, *Quadrula c. cylindrica*, *Toxolasma lividus*, and *Villosa arkansensis*. If preferred habitats were not subject to alteration, several of these species could be listed as currently stable.

Williams et al. (1993) summarized the potential threats

to endangered unionaceans under broad categories which included habitat destruction, introduction of nonindigenous species, and pollution. Habitat destruction resulting from impoundments (including secondary impacts associated with construction) (Brown and Brown, 1989; Harris, 1989c); construction of highways (Harris et al., 1992), water intake facilities (Harris, 1991c, 1991d), pipelines (Harris, 1990a, 1990c, 1991b, 1992c) and boat ramps (Harris, 1986, 1989d); and dredging associated with commercial mining (Harris, 1987, 1994c, 1995, 1997c), drainage projects (Jenkinson, 1989; Harris 1997a), and navigation (Christian, 1995; Posey, 1997) have undoubtedly reduced the quantity and/or quality

ty of available habitat in riverine systems. Pollution, primarily in the form of sedimentation, resulting from agricultural practices, silvicultural activities, and road building has negatively impacted localized unionacean communities (Brown and Brown, 1989; Harris, 1992a, 1996).

The nonindigenous zebra mussel (*Dreissena polymorpha*) occurs in both the Arkansas and White rivers. Davidson (1997) discussed adverse impacts due to zebra mussels to Arkansas River system unionaceans. The potential exists for extirpation of native species within entire river drainages (Riccardi et al., 1995).

Uncertainties regarding unionid bivalve taxonomy and systematics continue to plague efforts to understand the relative abundance and conservation priority status for many species. Taxonomic uncertainty regarding the *Lampsilis abrupta* complex (Harris and Gordon, 1987) has not been resolved. The identification of specimens currently referred to as *Lampsilis ornata* are uncertain, as are identifications of taxa within the genus *Pleurobema*. In addition, morphological variation of shell characters in the taxa currently recognized as *Cyprogenia aberti*, *Elliptio dilatata*, and *Ptychobranhus occidentalis* suggests that some level of differentiation may have occurred and taxonomic recognition may be warranted. Specifically, specimens from the White and St. Francis river drainages are distinct and recognizable from their counterparts found in the Ouachita, Arkansas and Red river drainages. Obviously, more rigorous analysis using comparisons of internal anatomy and biochemical systematic techniques should be undertaken.

Finally, the lack of unionacean surveys for many stream systems hampers true understanding of conservation status listings. Relatively large Arkansas River tributaries such as Illinois Bayou, Fourche La Pave River, Petit Jean River, Point Remove Creek, Cadron Creek, Maumelle River and Little Maumelle River have not been surveyed to determine unionacean bivalve species composition and distribution. Within the Ouachita River system, little is known regarding the unionaceans of Bayou Bartholomew, Terre Noire Creek or the Antoine River. Within the White River System, systematic unionacean surveys have not been conducted for the Kings River, War Eagle Creek or Eleven Point River systems. Many Red River system tributaries such as Cossatot River, Saline River, Bodcau Bayou, and Dorcheat Bayou remain relatively unknown regarding their unionacean faunas. Obviously, much work remains to be completed before the distribution and relative abundance of Arkansas unionaceans can be truly assessed.

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